

# A NEW CRAB, *COSTACOPLUMA CONCAVA* FROM THE UPPER CRETACEOUS OF NIGERIA

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ABSTRACT. A new genus and species of retroplumid crab is described from the upper Cretaceous of Nigeria and comparisons are made with *Retropluma* and the closely allied genus, *Archaeopus*. *Archaeopus senegalensis* Remy is transferred to the new genus.

INCLUDED in a collection of fossils from the upper Cretaceous of Nigeria, deposited in the Department of Palaeontology, British Museum (Natural History) by Professor R. A. Reyment (formerly of the Nigerian Geological Survey), are two crabs from the Coniacian of Abakaliki Province of East Central Region, three from the ?Maastrichtian of Shendam, Plateau Province of Benue-Plateau Region, and ten from the upper Campanian of Enugu Province, East Central Region.

The transverse ridges on the dorsal surface of the carapace, the narrow front, together with the structure of the orbital and antennular cavities clearly place these crabs in the Retroplumidae as defined by Glaessner (1969, R531). The new material, however, possesses features sufficiently distinct from *Retropluma* to allow a new genus, *Costacopluma*, to be described.

## SYSTEMATICS

Section BRACHYRHYNCHA Borradaile, 1907  
Superfamily OCYPODOIDEA Rafinesque, 1815  
Family RETROPLUMIDAE Gill, 1894  
(= Ptenoplacidae Alcock, 1900)  
Genus COSTACOPLUMA gen. nov.

*Type species.* *Costacopluma concava* sp. nov.

*Derivation of name.* Referring to the strong transverse ridges and the familial root.

*Diagnosis.* Carapace transversely suboval with three transverse arched ridges, the foremost extending across the protogastric lobes to unite with the mesogastric lobe; the areas between the ridges are concave; the lateral edges are thinly raised from the front to the posterior ridge and the urocardiac depression is distinct. The 5th coxae are subdorsal.

*Costacopluma concava* sp. nov.

Plate 97, figs. 1-9

*Derivation of name.* The trivial name refers to the concave areas between the transverse ridges on the carapace.

*Diagnosis.* *Costacopluma* with anterolateral notch, anterior transverse ridge reaches

the lateral margin, areas between ridges deeply concave. Flat triangular rostrum not strongly produced.

*Material.* Fifteen more or less complete carapaces from three horizons in South-east Nigeria: Holotype, In. 44642 (Pl. 97, figs. 1-3) and paratypes, In. 44643-In. 44648, In. 44650-In. 44652, upper Campanian, Zone of *B. polyplacum*, horizon of *Libyoceras afikpoense*, Anofia, on River Cross c. 8 miles (c. 12 km) south of Afikpo Government Station, Enugu Province, East Central Region. Additional paratypes are In. 46496-In. 46498, from ?Maastrichtian, Shendam, Plateau Province and In. 46499-In. 46500, Coniacian, Awgu Limestone, Awgu, Abakaliki Province, East Central Region.

*Description.* The carapace is suboval in outline, the length being about two-thirds the greatest width; it is gently arched longitudinally and transversely nearly flat. The lateral margins are inclined almost at right angles to the dorsal surface and the lateral edges from the front to the ridge on the metabranchial lobe, are drawn up slightly into a thin rounded ridge. The anterolateral margin is short and the broadly rounded lateral angle is about two-thirds distant from the front. The posterolateral angles are sharp and lead by shallow incisions for the 5th coxae into the posterior margin which is nearly straight, bounded by a low ridge and as wide as the orbitofrontal margin. The orbitofrontal margin is nearly straight and occupies about three-quarters of the greatest width of the carapace. The sharply triangular rostrum is steeply downturned and thinly grooved round the apex of fused frontal lobes reaching nearly to its tip; the frontal lobes become more elongate and less prominent as growth advances. The orbits are subovate and directed forwards. The upper orbital margin, divided by a blunt spine into two nearly equal parts, is thickened to form a low granulated ridge and terminates externally in a rounded spine barely projecting beyond the front. The short, similarly thickened, and granulated lower orbital margin terminates at the buccal margin in a tuberant spine projecting somewhat beyond the upper orbital margin. A thin septum separates the basal antennular segments which occupy about a third of the antennular-orbital cavity; the segments are not well preserved, but appear to be triangular with the angles much rounded. The orbital peduncle is long, slightly contracted medially, and almost circular in transverse section. The corneal surface is oblique and, where it is laying in position on the type, directed downwards.

From a shallow marginal notch, the cervical groove curves inconspicuously to a pit level with the narrow part of the mesogastric lobe, then commencing with another pit the cervical groove deepens considerably and passes across the mid-line of the carapace some two-thirds distant from the front. The dorsal surface is divided transversely by three ridges; the foremost curves broadly forward from the lateral margin across the protogastric lobes to unite with the tip of the mesogastric lobe; the crest of the second ridge crosses the fused epi- and mesobranchial lobes and extends

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EXPLANATION OF PLATE 97

*Costacopluma concava* gen. et sp. nov.

Figs. 1-5, 7-9 from the upper Campanian of Enugu Province, Nigeria. 1-4, holotype BM. In. 44642.

1, dorsal view. 2, right lateral view. 3, anterior view showing orbital peduncle. 4, ventral view. 5, 9, paratype BM. In. 44644. 5, dorsal view. 9, anterior view. 7, 8, paratype BM. In. 44647. 7, dorsal view. 8, ventral view. All  $\times 2$ .

Fig. 6, from the ?Maastrichtian of Plateau Province, Nigeria. Paratype BM. In. 46497. Dorsal view,  $\times 3$ .



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downwards from the lateral margin towards the base of the mesogastric lobe. The third ridge, on the metabranchial lobe, occurs about midway from the second ridge to the posterior margin; it is directed upwards in a broadly sinuous curve and although interrupted by deep epimeral muscle scars, it continues across the carapace by a row of four tubercles on the anterior of the cardiac region. The cardiac region is sub-pentagonal in outline and has another small tubercle at its base. The mesogastric lobe forms an elongated oval; at its base are three forwardly directed pits set in an inverted triangle, the lateral ones being the most prominent. On each metabranchial lobe is an elongated tubercle close to the posterior margin. There is a tendency for the ridges to become sharper as growth advances. While the subsurface shell layer of the ridge tops exposed on the holotype is seen to be pitted, they are normally smooth or lined with granules. The areas between the ridges are markedly concave and finely pitted; several larger pits are scattered along the outer course of the cervical groove in addition to those already mentioned.

The triangular pterygostomian process is inflected almost at right-angles to the carapace margin; a faint groove extending from the cervical groove curves towards the buccal margin, and the sternal border is bounded by a strong granulated ridge (In. 44647, Pl. 97, fig. 7). The buccal cavity is about as broad as long and the margins are straight. The ischiognath of the 3rd maxilliped is about twice as long as wide and a shallow longitudinal depression reaches a little over one-half the width from the convex inner margin; the outer margin is nearly straight. The merognath is subovate in outline and almost as long as the ischiognath, a low ridge extends to the articulating facet and the outer margin is thickened; the three segments of the palp are of equal length. The exognath tapers distally and reaches to about the middle of the merognath, its width is a third of its length and there is a depression along the outer margin.

The abdominal sternites are very wide; the 1st-3rd are separated by transverse grooves and are divided by a median cleft widening posteriorly; the groove separating the 3rd from the 4th sternites runs back a short way from the margin before turning sharply inwards. The 5th-7th sternites are drawn up into strong oblique ridges, while the 8th is much reduced and subdorsal.

Male abdomina only are preserved and none is complete. The 4th-6th somites are of about equal length and rapidly decrease in width so that the width of the posterior margin of the 6th is one-half that of the anterior margin of the 4th; they are divided from each other by sutures and each has a median transverse ridge. The telson is about twice as long as broad, it widens slightly coincident with the 4th/5th sternal groove before tapering to a broadly rounded apex. The abdominal trough is deep and extends almost the entire length of the 4th sternite.

The specimens range in size from 6.9 mm to 26 mm across the carapace; those from the Coniacian and ?Maastrichtian localities are smaller than those from the Campanian, but this may represent only a collecting bias, since fewer specimens were collected from the first two localities.

*Discussion.* Hitherto, the earliest known member of the Retroplumidae has been *Retropluma eocenica* Via. It differs from *Costacopluma concava* in having much straighter anterior and posterior transverse ridges and in the posterior one (across the metabranchial and cardiac lobes) being more entire; the anterolateral margin in

*C. concava* is continuous with the general marginal curvature towards the front, but in *R. eocenica* it is slightly hollowed.

The family Retroplumidae was erected by Gill (1894) to contain *Retropluma* Gill, 1894 (= *Archaeoplax* Alcock and Anderson, 1894 *non* Stimpson, 1863) which is represented in the Lutetian of Spain by *R. eocenica* Via, in the Pliocene of Italy by *R. craverii* (Crema), and by four Recent species inhabiting the Indo-Pacific region. *Archaeopus senegalensis* Remy (1960*b*, p. 316) from the Palaeocene of Senegal is very close to *C. concava* and must be included in *Costacopluma*. It differs from *C. concava* by the absence of an anterolateral notch and the anterior ridge does not reach the lateral margin; the mesogastric lobe of *C. concava* is smaller and the transverse ridges are narrower with steeper slopes and the areas between the ridges are more concave. The median transverse ridge of *C. senegalensis* is more continuous, i.e. with shorter gaps between the segments of the ridge. The triangular rostrum of *C. senegalensis* is more strongly produced, with its median depressed and the margins elevated, also the orbits are wider. *C. senegalensis* would appear to be a direct descendant of *C. concava*.



TEXT-FIG. 1. *Costacopluma senegalensis* (Remy). Holotype,  $\times 2$ . Reproduced from *Bull. Soc. géol. Fr.* (7) 1, pl. 19a, fig. 1, with the kind permission of the Société géologique de France.

Burlen (1930, p. 352) included the Cretaceous *Archaeopus* Rathbun, 1908 from North America in the Retroplumidae, and whilst Glaessner (1969, R532) tentatively placed it in the Palicidae, Via (1969, p. 339) again drew attention to the affinities of this genus to *Retropluma*; also it appears to be closely related to *Costacopluma*. *Archaeopus* is known by two species, *A. antennatus* Rathbun and *A. vancouverensis* (Woodward) both from the upper Cretaceous (probably Campanian) of western North America. Both species have well-developed ridges across the carapace, but the gastric one (less well defined in *A. antennatus*) is more or less straight, not arched as in *Costacopluma*, in which the branchial ridge also differs by curving down towards the posterolateral angles. The cervical groove follows much the same course in both

genera, but does not weaken laterally in *Archaeopus*. The lateral margin of *Costacopluma* is entire whereas the margin of *Archaeopus* is dentate. Via (1957, p. 554; 1969, p. 339 *et seq.*) postulated that the origin of the Retroplumidae (in which he includes *Archaeopus*, *Retropluma*, as well as *Ophthalmoplax*) lay in the Americas during the Cretaceous. He suggested that a primitive, more robust, stock stayed in America—*Archaeopus* in North America and *Ophthalmoplax* in the region of the Gulf of Mexico and northern South America—and another migrated eastward, adapting as it did so, to deeper waters. It is difficult to accept entirely Via's suggestion as to the origin of the family since the Coniacian specimens from Nigeria are older than all the American species, except for *Ophthalmoplax comancheensis* Rathbun (1935, p. 54) which was based only on fingers from the Comanche Series (Albian) of Texas. It would appear that *Costacopluma* started to adapt to deeper water within the North African area. There is no evidence for any deep-water deposits in the Cretaceous of Nigeria but by Palaeocene times Tessier (1952, p. 414) thought that the total Palaeocene fauna of Senegal indicated a well-aerated, moderately deep sea of a maximum of 50 m depth. Via (1969, p. 325) summarizes the details of catches of Recent *Retropluma* spp. The shallowest species he records is *R. denticulata* Rathbun which is caught off the coasts of Japan in the depth range 80–125 m. The presence of the ocypodid *Goniocypoda tessieri* Remy in the Maastrichtian of Senegal suggests that it is possible that Africa might have been the centre of ocypodid evolution. An eastward trend from Africa, possibly through southern Europe towards south-east Asia had certainly been established by Miocene times for both the Retroplumidae and Macropthalminae.

Previous knowledge of fossil crabs from Nigeria has been limited to descriptions by Withers (1924) of the xanthid, *Holcocarcinus sulcatus* and a xanthid cheliped, both from the middle Eocene (Lutetian) of Ameki, southern Nigeria. From nearby Senegal and Ivory Coast, Tessier (1952) and Remy (1954; 1960*a, b*) have recorded: from the Maastrichtian—*Zanthopsis africana* (Remy), *Goniocypoda tessieri* Remy; from the Palaeocene—*Necrocarcinus simplex* Remy, *Raninella ornata* Remy, *Laeviranina* sp., *Pleolobites erinaceus* Remy, *Menippe frescoensis* Remy, *Zanthopsis multispinosa* Remy, *Zanthopsis* sp., *Branchioplax ballingi* Remy, *Glyphithyreus wetherelli* (Bell); from the Ypresian—*Glyphithyreus wetherelli*; and from the Lutetian—*Colneptunus hungaricus lutetianus* Remy, *Colneptunus* sp., *Palaeocarpilius straeleni* Remy, *Micromaia simplex* Remy, *Atelecyclus gorodiskii* Remy, *Zanthopsis africana*, and *Branchioplax ballingi*. Joleaud and Hsu (1935) described *Necrocarcinus multituberculatus* (Joleaud and Hsu) and a new genus of the family Potamididae from the upper Cretaceous of the Niger Territory.

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